A RAPID AND ACCURATE METHOD OF SCORING NONSENSE SYLLABLES AND WORDS[1]

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In all memory work, the determination of the subject's retentive capacity is undoubtedly the chief factor. When we determine retentiveness by the *time taken to relearn* after a certain interval has elapsed, the method is easy, since the only measurement we have to consider is *time,* i.e., we compare the subject's *time of relearning* with his *time of initial learning.* When, however, we desire to ascertain the subject's retentiveness, say after an interval of one week, by requesting a reproduction without a fresh presentation, the determination is more difficult since our only method then is to determine the subject's retentiveness by the amount and nature of the material that he has actually been able to reproduce, i.e., to recall.

Where logical or meaningful material (e.g., a passage of prose or poetry) is used, the scoring of the work reproduced offers fewer complications than does the scoring of an attempted reproduction of a set of nonsense syllables or words. The latter may not necessitate so much time; but the difficulty of dealing with the errors, omissions, insertions, etc., makes an accurate scoring exceeding difficult since it is difficult to determine, from the reproduction, what associations were originally formed, because the material is less logical in character.

In 1908 I started experiments with digits, words and nonsense syllables in which it was necessary to determine the amount retained by each subject after an interval of one week had elapsed. Digits are so simple in character that they offer but few difficulties; but although many methods were tried for nonsense syllables and words, none of the methods seemed satisfactory. The widely different marks obtained with the various methods of scoring in general use, show that some of these methods must be erroneous. For nonsense

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[1] The method as set forth in this article refers only to words and nonsense syllables of three letters.

syllables, probably the most accurate of the methods tried was that of Ebbinghaus; but even here not only was the method long and laborious, but the scores obtained were frequently such that I felt quite sure, from a general survey of the attempted reproductions and from a comparison with the subject's retentiveness for other material, that the scores as given by the Ebbinghaus method were too low.

In the following pages I have attempted to describe a method which I have found to be most satisfactory for both nonsense syllables and words. Its chief advantage lies in the speed with which each subject's score can be obtained after one has become familiar with the method. Probably the best way of obtaining an understanding of this method is to examine a few typical cases.

At the end of this paper will be found copies of the reproductions as handed in by three subjects in a class in experimental psychology. The nonsense syllables and words are given just as they were written, with the errors, omissions, dashes, etc.

The original list of nonsense syllables and words was as follows:

VUS	TUB
YIF	PIN
MAV	HEN
JEP	BED
VOB	LID
FEG	GEM
WOF	BUD
TIB	CAR
NUZ	MAT
BOF	ROD
JED	JUG
KIB	FOG
VEL	LAD
ZID	SOD
BOL	PEN
SEF	CAT
YAB	RAG
KUV	BOX
TEF	NET
NAD	GUN

Briefly stated, the method for nonsense syllables was as follows: Each correct letter, provided the syllable was in the

correct position,[2] received a score of one, and the syllable received an extra score of one for being in the correct position. Thus a perfect syllable in the correct position received a mark of 4, while a syllable correct in itself, but not correct in position, received a score of only 3. If the position were correct and the syllable had two of the three letters correct[3] it was scored 3. If two of the three letters of the syllable were correct but the *position* of the syllable itself were not correct, either relative or absolute, it was not scored at all. Therefore, unless position is correct, the separate letters do not count unless *all* are correct.[4] It must be remembered that, as before said, if a syllable is correct, but is not in the correct position, it gets 3, and only 3, counts, since each syllable that is in the correct position and also correct in itself receives a count of 4. Therefore, the highest count obtainable for a list of 20 syllables would be 80. This method of scoring can be made clear by examining a typical case. Take, for example, the list written by J. McH., as given at the end of this paper. *VUS* gets 4 counts, since it is correct in everything. *VIF* gets only three counts, since, although its position is correct it starts with V instead of Y. *JEP* gets 3 counts; had it been in the correct position it would have received 4, since when a syllable is correct, except that it is in the wrong position, it is credited with 3 counts,—one for each letter. *RIL* receives no score at all, since there was no such syllable. *BOV* receives a score of 2, for it contains all the letters that occur in *VOB* and besides is in the correct position, i.e., where *VOB* should be. *SIR* receives no score at all. It is quite likely a pure guess, and put down merely to secure correctness of position for the two following syllables. We are led to believe this when we perceive that the next two syllables, *WOL* and *TID,* have two letters correct in each, and their positions are also correct.

The subjects were told to draw a line under the last syllable they wrote if they felt sure that it *was* the last syllable. In this way the last syllable was given a score of 4 if it was the correct syllable and was also underlined, even if it was

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[2] " Correct position " here, as with digits, may mean correct *relative* position or correct *absolute* position. A syllable is in the correct *relative* position when it is preceded by the correct syllable, or by a syllable of which two letters are correct, provided that these letters themselves be in the right order.

[3] Provided these two letters themselves were in the correct order.

[4] When, however, all three letters were written but not in correct order, i.e., the letters reversed,—the syllable received a score of 1, and if the position was correct, a score of two.

not preceded by the correct syllable;—it was given a score of 4 since it had the correct absolute position.

With words a method similar to that used with nonsense syllables was employed.

A score of 1 was given if the position, whether relative or absolute, was correct. Here also correctness of the relative position was determined by the preceding word. An extra count was given if any two letters[5] were correct, provided that the position of the word was correct. If the word itself was correct it received still an extra count, thus raising the count to three. Therefore, the highest count obtainable for any word was 3, and therefore, the highest score obtainable for the 20 words was 60. This method, like that for the nonsense syllables, can best be understood by an examination of one of the subject's papers. Take, for example, that of the subject reproduced at the end of this article. Let us see how we arrived at the total score of 15. *TUB* received a score of 3 since it is in the correct position and the word itself is correct. *PEN* receives a score of 3, one because two letters of the word are correct, one because the word (as far as the two letters are concerned) is in the correct position, and still an extra mark being given since the word itself is one occurring in the list.[6] *CAT* receives a score of 3,—one because it contains two correct letters, 1 because it is the correct word itself and another count because it is in the correct position, being preceded by the word *PEN*. *MAN* receives no count at all, there being no such word. *PIN* receives a count or 2,—1 because it contains two correct letters and an extra count because it is the correct word. It cannot receive a count for position, neither the relative nor the absolute position being correct. *RUG* receives no count at all. We are tempted to give it a mark of some sort on account of its close similarity to the word *JUG* but this would be precarious as there are many words that rhyme with *JUG* and many such words might have been written at random. We are also tempted to give the word *RUG* a score of 1 as it is similar in meaning to the word *MAT*. This also would be unwise since many words might have been given,

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[5] The same rule was used here as in the case of the nonsense syllables and the two letters themselves had to be in the correct order.

[6] This is an exceptional case. With the list in question it is the only word with which such a case can occur, for the reason that, though in one sense the word is not in the correct position, yet two letters of it are, it being in the place that *PIN* should be. Obviously, cases similar to this occur very rarely and would not occur at all if the list of words used did not contain two words so nearly alike as *PEN* and *PIN*.

that in the examiner's mind might have been considered similar to the word *MAT*. In fact in the case of this particular subject we have proof that the word was not put down for this reason as the word *MAT* itself is mentioned as the next word. Therefore, taking everything into consideration, I considered it safest not to give any credit whatsoever for such words. The next word *MAT* gets a score of 2,—1 because it has two letters correct and an extra 1 because it is the correct word itself. *RAG* gets a score of 2 for the same reason. The next four words, *WIT, RAT, BOY* and *RUN,* receive no credit whatsoever, there being no such words.

A score of 1 was not given a word having two letters correct unless the *position* of the word itself was correct. Otherwise the word *RUG* would receive 1 count since it contains the letters *UG*. Had *RUG* been preceded by the word *ROD* it would then have received 2 counts instead of none at all,—1 count for having two letters correct, and an extra count for being in the correct position.

To make this method of scoring still plainer, we shall examine another paper,—that of subject M. K., also reproduced at the end of this article. The first word *TUB* is given 3 counts, it having 2 letters correct, it also being the correct word, and also being in the correct position. *HEN* is given a score of 2, it being the correct word but not in the correct position. For like reasons *JUG* is scored 2. *RAT* receives no score at all although it has two letters, *AT,* that are correct (they being also in the word *CAT*). The word, however, is not in the proper position either relative or absolute and hence can receive no count at all. Words of this kind receive a score of 2 or nothing, for reasons given in detail under nonsense syllables. The fairness of this rule is made clear when we realize that had the word *RAT* been preceded by the word *PEN,* the chances of *RAT* having been a mere guess would be greatly lessened. *TAN* receives no count at all. To the next word, *MUG,* one is tempted to give a score of 1, since it contains the two letters *UG* which are also contained in *JUG*. It would have received credit for these two letters had the word been preceded by *ROD*. Not being preceded by *ROD* it is given no count at all. That this is perfectly fair is in this particular case very conveniently shown by the appearance later on of the word *RUG* which, although there is no such word, is given a score of 2, it being preceded by the correct word *CAT*. The two letters that are correct in this case are *R-G* and although separated by the wrong vowel *U* they are in the proper order. *PEN* receives a score of 2, it having two letters correct and also

being the correct word itself. *BED* receives a score of 3, 1 because it contains two correct letters, 1 because it is the correct word itself, and 1 because it is preceded by the correct word. In this case the "preceding" word is not wholly correct but it contains two correct letters, and thus *BED* gets a higher scoring than it would have received had it been preceded by the word *AXE,* for example. The last word *GUN* receives a score of 3, it being in the correct absolute position for the reason that it is underlined, this proving that the subject knew that it was the last word.

Reproduction of Nonsense Syllables and Words
By J. McH.

VUS....	TUB...
VIF...	PILL..
JEP...	RAG..
RIL	CAN
BOV..	———
SIR	———
WOL...	———
TID...	BAR..[7]
	DOG
	SUN
Total Score for	FLY
Nonsense Syllables	———
18	———
	MAT..
	BAG
	BOX...
	TOP
	LID..
	MAN

Total Score for
Words, 16.

Reproduction of Nonsense Syllables and Words
By A. F.

VUS....	TUB...
YIF....	PEN...
MAV....	CAT...

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[7] *BAR* receives a score of two although it is neither preceded by the correct word nor is the word itself correct. The correct word here is *CAR,*—and *BAR* receives a score of 1 for having two letters correct and another score of 1 because the word is in the correct absolute position.

JEB...	MAN
VOS...	PEN..
WEF...	RUG
FEG...	MAT..
TIB....	RAG..
NUZ....	WIT
LOD..[8]	RAT
GER..[8]	BOY
KUL	RUN
YAB...	

Total Score for   Total Score for
Nonsense Syllables   Words 15.
          39

*Reproduction of Nonsense Syllables and Words
By M. K.*

VUS....	TUB...
YIF....	HEN..
TIB...	JUG..
BIF[9]	RAT
JEB...	TAN
———	MUG
———	CAT..
———	RUG..
NAB...	PEN..
———	BED...
	GUN...

Total Score for   Total Score for
Nonsense Syllables   Words 19.
          17

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[8] *LOD* and *GER* both receive a score of 2 notwithstanding that they have only one letter correct, i.e., the vowel. As said on page 527, even though a syllable has two letters correct, if it be not in the correct position (either relative or absolute) it receives no score at all. When, however, the *absolute* position is correct (as it is in the above case) *each letter that is correct is scored.* Therefore, each of the above two syllables receives a score of 2,—1 because it is in the correct absolute position, and 1 for having a correct letter.

[9] *BIF,* though similar to the tenth syllable *BOF,* can receive no score, it being in neither the correct *relative* nor the correct *absolute* position. It has, however, two letters that occur in *BOF,* for which it may have been mistaken. *JEB (JED)* on the other hand receives three counts, it being in the correct relative position with reference to the preceding syllable *BIF (BOF).* It will thus be seen that in cases like this, what one syllable loses it gives to the other.